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his 36th paper, as a result of continued study on the flora of Central America. The article includes descriptions of 12 species of flowering plants new to science.—J. D. SMITH and J. N. ROSE (Contr. U.S. Nat. Herb. 16:287-298. 1913) have published a "Monograph of the Hauyeae and Gongylocarpeae, tribes of Onagraceae." The study embraces 4 genera and 14 species; two new generic names are proposed, namely, *Xylonagra*, based on *Oenothera arborea* Kellogg, and *Burragea*, based on *Gaura fruticulosa* Benth.—W. W. SMITH (Rec. Bot. Surv. India 4:324-431. 1913) records the results of a botanical survey of South-east Sikkim, India, lists 925 species, and describes a new genus (*Paroxygraphis*) of the Ranunculaceae.—C. SPEGAZZINI (Ann. Mus. Nac. Buenos Aires 23:167-244. 1912) in an article on the Laboulbeniaceae of Argentina has published several new species and proposes two new genera, namely, *Cochliomyces* and *Laboulbeniella*. The same author (*ibid.* 1-146) under the title "Mycetes Argentinenses" continues the enumeration of the Mycetes of Argentina, adds several species new to science, and proposes the following new genera: *Eudimeriolum*, *Winteromyces*, *Trichospermella*, *Dasysphaeria*, *Criserosphaeria*, *Hormopeltis*, *Polhysterium*, *Symphaeophyma*, *Apiosporella*, *Ectosticta*, *Dasyticta*, *Dasyrena*, *Phaeopolynema*, and *Phaeolabrella*.—A. STEWARD (Proc. Calif. Acad. Sci. 1:431-446. 1912) records the lichens found on the Expedition of the California Academy of Sciences to the Galapagos Islands in 1905-1906. Sixteen species were found which were not before reported from the islands.—H. and P. SYDOW (Ann. Mycol. 11:93-118. 1913) have published several new species of fungi from northern Japan and characterize a new genus (*Miyagia*) of the Pucciniaceae found on leaves of *Anaphalis margaritacea*. The same authors (*ibid.* 254-271) under the title "Novae fungorum species X" have published several species new to science and propose the following new genera: *Aithaloderma*, *Schizochora*, *Cyclodothis*, and *Diedickeia* from the Philippine Islands, *Astrosphaeriella* and *Coccidophthora* from Japan, and *Nematostigma* from South Africa.—C. TORREND (Broteria, Ser. Bot. 11:73-98. 1913) under the title "Les Basidiomycetes des environs de Lisbonne et de la région de S. Fiel (Beira Baixa)" includes the descriptions of several new species and proposes one new genus, namely, *Lycoperdellon*, based on *Lycogala Torrendii* Bres.—I. URBAN (Bot. Jahrb. 50: Beibl. 111. pp. 1-108. 1913) under the title "Plantae novae andinae imprimis Weberbauerianae VI" in cooperation with several specialists has published an important paper on the Andean flora. About 125 species new to science are described.—H. F. WERNHAM (Jour. Bot. 51:218-221. 1913) has published 11 new species of Rubiaceae from tropical America.—R. S. WILLIAMS (Bryologist 16:36-39. pl. 4. 1913) reports *Brachymenium macrocarpum* Card. from Florida and describes a new species of *Funaria* (*F. rubiginosa*) from Montana.—J. M. GREENMAN.

Metabolism of fungi.—Believing that methods based on a determination of the yield, or of the economic or the respiratory coefficients do not give a satisfactory quantitative representation of the manner of utilization of carbon

compounds by fungi, WATERMAN² has applied the conceptions of "plastic equivalent" and "respiratory equivalent" to the study of the carbon metabolism of *Aspergillus niger*. The "plastic equivalent" for carbon is defined as that fraction or percentage of the consumed carbon which at any given moment is contained in the substance of the organism. Similarly, the "respiratory equivalent" is the percentage which has up to that moment reappeared as carbon dioxide. Experimentally these relations are obtained by determinations of the carbon given off in respiration, the quantity fixed in the body of the fungus, and the total quantity that has been consumed.

The author has studied from this point of view the assimilation of glucose, levulose, mannose, and a number of organic acids. As a rule, however, only the plastic equivalents were determined, the respiratory equivalent having been determined only for succinic acid. The results show, apparently to the mild surprise of the author, that the plastic equivalent is high during the early stages of growth, and falls with increasing age of the culture; while the greater part of the carbon nutrient disappears during the first few days of growth. From these observations he arrives at his main conclusion, that the temporary accumulation of carbon in the fungus is due to the formation of an intermediate product which he finds to be glycogen. This view, of course, presents nothing novel, for it is well known that in the presence of an excess of food, reserve materials, which in fungi mostly take the form of glycogen, are stored in the plant body, and that respiratory activity, decreasing the "plastic equivalent," continues at the expense of reserve materials and even at the expense of proteids when the external food supply has been exhausted. All such substances must in this sense be regarded as intermediate products. In this connection it may be pointed out that from the discrepancy between the quantity of carbon dioxide developed by a fermenting mixture and that which should have been developed according to the quantity of glucose (determined by change in rotation) which disappeared from the mixture, EULER and JOHANSSON³ have recently concluded that intermediate products were first formed from the glucose in the process of fermentation. Regarding the author's method it should also be stated that SPIEKERMANN,⁴ without giving special names to the ratios, determined for a species of *Penicillium* growing on glycerin the percentage of the consumed carbon fixed in the plant body, and that given off in respiration.

Finally, WATERMAN has investigated the influence of various factors in relation to the plastic equivalent. Changes in temperature and in concentration of the nutrient medium do not influence the nature but only the rate of

² WATERMAN, H. I., Beitrag zur Kenntnis der Kohlenstoffnahrung von *Aspergillus niger*. Folia Microbiol. 1:422-485. 1913.

³ EULER, H., und JOHANSSON, D., Umwandlung des Zuckers und Bildung der Kohlensäure bei der alkoholischen Gärung. Zeitschr. Physiol. Chem. 76:347-354. 1912.

⁴ SPIEKERMANN, A., Die Zersetzung der Fette durch höhere Pilze. Zeitschr. Unters. Nahrungs- u. Genussmittel 23:305-331. 1912.

metabolism. The magnitude of the plastic equivalent is to a high degree dependent on the nature of the carbon nutrient. This relation is correlated with the heats of combustion of the carbon compounds. Those having the greater caloric value give the highest plastic ratios.—H. HASSELBRING.

Bud variations and fruit markings.—This very interesting question is the subject of a paper by KRAUS,⁵ who has been making studies on the effects of cross-pollination of cultivated fruits. The author calls attention to the frequent occurrence of banded or striped fruits, especially among apples. The most common explanation of this phenomenon is the secondary influence of pollen, but the author explains that this cannot be true xenia, such as occurs in corn. Correspondence with horticulturists and botanists indicated a prevailing opinion that it is due to secondary influence of pollen, though a number believed it due to bud-variation. After explaining the economic importance of the problem, the author describes his methods of work. The conclusions are as follows: "color in the pome fruits is not influenced directly in the immediate cross; new characters cannot be added by the pollen, outside the seed itself, in the immediate cross; the manifestation of color is dependent on many environmental factors; color as usually found is composed of a number of unit characters; somatic segregation may occur and by this means the several factors of color manifest themselves more or less independently (the several colors may appear as bands more or less parallel, or a band of but one color surrounded by the normal color); similar segregation may extend to any group of unit characters of which the plant is composed; segregation may extend to either fruit or leaf buds; if the latter, such variations may be propagated asexually; red in apples may consist of either a single or a complex of unit characters; at least, three reds are recognizable; somatic segregation may be of service to plant breeders as indicating the unit characters of a plant that are likely to exhibit themselves when propagated sexually; segregation generally extends to the flower bud only in apples, while in pears the shoot is frequently affected."—MEL T. COOK.

The development of chalazogams.—NAWASCHIN and FINN⁶ have published a contribution in German which extends the study of *Juglans* published in Russian a year ago and already noted in this journal.⁷ The principal conclusions are: that in seed plants there is a tendency to reduce the male gametes from sperms to naked nuclei; that the evolution of the pollen tube and simplification of the sperm go hand in hand; that *Juglans* and other chalazogamous plants with a well developed binucleate cell which reaches the embryo

⁵ KRAUS, E. J., Bud variations in relation to fruit markings. Biennial Crop Pest and Horticultural Report for 1911 and 1912. Oregon Agric. Exp. Station. pp. 71-78.

⁶ NAWASCHIN, S., and FINN, V., Zur Entwicklungsgeschichte der Chalazogamen. *Juglans regia* und *Juglans nigra*. Mém. Acad. Imp. Sci. St. Pétersbourg 31:1-59. pls. 1-4. 1913.

⁷ BOT. GAZ. 55:94. 1913.